

**SAMPLING AND ANALYSIS PLAN  
FOR  
HEPA FILTERS GENERATED  
FROM THE PROPERTY PROTECTION AREA**

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Prepared for:

**Rocky Flats Technology Site  
Golden Colorado 80402-0464**

Prepared by:

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ABBREVIATIONS AND ACRONYMS

ASD	Analytical Services Division
CI	Confidence Interval
DOT	U. S. Department of Transportation
DQO	Data Quality Objective
EPA	U. S. Environmental Protection Agency
IDC	Item Description Code
LDR	Land Disposal Restrictions
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram
mg/l	Milligrams per Liter
PA	Protected Area
pCi/g	pico-Curies per Gram
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFETS	Rocky Flats Environmental Technology Site
RMRS	Rocky Mountain Remediation Services
SAP	Sampling and Analysis Plan
TCLP	Toxicity Characteristic Leaching Procedure
UCL	Upper Confidence Limit
WAC	Waste Acceptance Criteria
WSRIC	Waste Stream and Residue Identification and Characterization

## 1.0 PROJECT DESCRIPTION

The purpose of this project is to collect representative samples of High Efficiency Particulate Air (HEPA) Filters, Item Description Code (IDC) 490 from Buildings 444, 881 and 883 and have them analyzed for radioactive isotope levels, toxicity characteristic metals (RCRA) and for volatile organic compounds (VOCs). Data from the analyses of these samples are needed to establish analytical baseline parameters for HEPA filters removed from the plenum of buildings where depleted uranium activities were performed and to demonstrate the population of HEPA filters under consideration is suitable for land disposal at the Nevada Test Site (NTS).

### 1.1 Description of the Site

The Rocky Flats Environmental Technology Site (RFETS) is located in northern Jefferson County, Colorado, about 16 miles northwest of Denver. RFETS is a government-owned, contractor-operated site that is part of the nationwide nuclear weapons production complex. More than 270 buildings and structures, of which about 75 are trailers, are located at the site. Major manufacturing, chemical processing, plutonium recovery, and waste treatment facilities occupy about 1.6 million square feet of this space. The remaining floor space is occupied by laboratories, administrative offices, warehouses, and utility, security, storage, and construction contractor facilities.

The primary mission of the site, prior to 1991, was production of components for nuclear weapons. Plutonium, uranium, beryllium, and stainless-steel parts were fabricated at the site and shipped off-site for final assemble. Additional activities included chemical processing to recover plutonium from scrap material, metallurgical research and development, machining, assembly, nondestructive testing, coating, remote engineering, chemistry, and physics.

At present, waste handling operations at the facility include storage, transportation, treatment, and packaging of waste materials. Wastes managed at the site include non-hazardous, hazardous, radioactive, and mixed radioactive.

### 1.2 Identification of Type of Waste to be Evaluated

HEPA filters are used in all of the buildings that contain or did contain plutonium and uranium processing activities. These HEPA filters are used in large plenums that filter room, hood and glovebox air. These filters consist of filter media contained within wooden or metal frame and are approximately 24"x 24"x12". In the standards the use of 14-gauge cadmium -plated or chromed carbons-steel are mentioned for framing; however, these would be special purpose filters used in high temperature environments and are not expected to be part of the population of filters under consideration.

The population of HEPA filters addressed in this SAP were used in the ventilation systems of the former uranium production Buildings 444, 881, and 883 to control the emission of radioactive particles to the environment. The filter material is not homogeneous because of the different materials used by the different manufactures of the filters. The frame material is either 3/4", fire-retardant, exterior -grade plywood or wood-particle board. Some of the HEPA filters may contain dividers which were made in part with non-friable asbestos. The HEPA filters in question may have been the first filters installed in the plenums or were installed during production years. Consequently, the analytical information gained from this sampling and analysis activity will cover production and present clean-up activities for former production buildings in the property protection area (PPA) with the exception of Building 886.

### 1.2.1 Building 444

Components containing uranium were manufactured in Building 444. The building housed a foundry, as well as machining and welding operations. Parts were also etched in Building 444. Building 450 contains the mechanical equipment used to ventilate Building 444. The used HEPA filters are characterized in the WSRIC building book for Building 450 and are managed as low level waste. The filters under consideration were removed from stage I of the plenum between December 1994 and October 1995.

### 1.2.2 Building 881

Building 881F contains the filter plenum used to filter air from Building 881 and 881A. Building 881 housed various analytical, research, plant support functions and fabrication processes. Filters were removed from this plenum on 8/24/94. The HEPA filters are characterized in the WSRIC building book as low level waste.

### 1.2.3 Building 883

In Building 883, rolling forming and heat treating processes of depleted uranium used furnaces and molten salt baths to prepare metal ingots, or parts, changing their physical characteristics for specific use. In addition, parts were shaped, polished, and cut. All processes are no longer used. The HEPA filters from Building 883 were removed on 5/22/90 and came from plenum "B". The plenum was located inside the building. It has been removed and replaced with the plenum in Building 879, the Building 883 exhaust plenum. This was before Waste/Residue Travelers and WSRIC waste streams were implemented. The HEPA filters are managed as low level waste.

Table 1-1 WSRIC CHARACTERIZATION

PROCESS NAME	PROCESS NUMBER	IDC OR WFC	CHEMICAL CONSTITUENT CODE RCRA-REGULATED	CHEMICAL CONSTITUENT CODE NONRCRA-REGULATED	COMP. CODE	RCRA HAZARDOUS WASTE	LAND DISPOSAL RESTRICTED	EPA CODE/S
FILTER PLENUM	450-1-2	0490	00	00	NA	No	No	
FILTER PLENUM	881F-1-2	0490	00	02	NA	No	No	

### 1.3 Sampling and Analysis Plan Objectives

The objective of this SAP is to obtain analytical data to demonstrate that the HEPA filters waste form, IDC 490, meets the NTS Waste Acceptance Criteria (WAC) and is therefore suitable for disposal at that facility. Due to their function as traps for particulates, it is possible that non-radioactive metals and other inorganic particulates have collected on the filter media. Since these filters are not absorptive of organic compounds, it is much less likely that organic toxics will be found. However, a decision has been made to include this analysis in order to ensure that no listed substances of this type are present, particularly in buildings where large volumes of solvents were used. After a reasonable body of data has been collected, it will be evaluated, and the necessity of continuing this analysis will be reviewed.

#### 1.4 Analytical Requirements

The analytical requirements apply to samples of the HEPA filters. The waste characterization requirements are based on the waste acceptance criteria of the Nevada Test Site and historical information of chemicals used in the building. The parameters are summarized in Table 1-2. Detection limits for chemical analysis will be those associated with the analytical procedures described in SW-846, Test Methods for Evaluating Solid Waste, Physical Methods, 3<sup>rd</sup>. ed. Required Detection Limits (RQL) are specified in the Analytical Services Division (ASD) Statement of Work for Analytical Measurements. The samples will be analyzed for radiological isotopes by alpha spectroscopy as defined in the ASD Statement of Work for Analytical Measurements - RC01. There is presently no statement of work to analyze samples by gamma spectroscopy.

##### Isotope

Am-241  
Pu-238  
Pu-239/240  
Pu-241  
U-233/234  
U-235  
U-238

These isotopes are specified because they are affiliated with the activities performed at RFETS. If analysis indicates other radioisotopes are present, they will be identified on the analytical reports. Plutonium, americium and uranium are analyzed by alpha spectroscopy (all other isotopes will be analyzed by gamma spectroscopy).

Table 1-2 Analysis Requirements

ANALYSIS REQUIRED	METHOD	SAMPLE VOLUMES
Gross Alpha/Beta screen - DOT		15 - 50 grams (10 Sheets)
TCLP Volatiles, standard analyte list	SW-846 8260, 1311	60- 90 grams (20 Sheets)
Radioactive Isotopes	Alpha/Gamma Spectroscopy	125 - 150 grams (30 Sheets)
TCLP Metals, standard analyte list	SW-846 1311, 6010, 7471A	125 - 150 grams (30 Sheets)

#### 1.5 Use of Results

Results from the execution of this SAP will be reviewed and verified and then used to satisfy the objective provided in Section 1.3.

## 2.0 SAMPLING AND ANALYSIS ORGANIZATION AND RESPONSIBILITIES

The organizations that will be involved in this sampling effort and their responsibilities are presented below.

### 2.1 Waste Management

Rocky Mountain Remediation Services (RMRS) Waste Management provides storage, treatment and disposal services for RFETS waste. Waste Disposal Projects identifies opportunities for disposal and coordinates efforts to initiate and complete the disposal of waste. The Customer Service Organization is responsible for SAP preparation, data review, and preparing of data packages. Solid Waste Operations is responsible for locating the HEPA filters to be sampled, positioned and preparing all filters to be sampled and collecting the samples.

### 2.2 Analytical Services Division

The Analytical Services Division (ASD) generates sampling requests, schedules sampling activities, tracks and receives data package, verifies the data and maintains the permanent analytical record. If validation of analytical results is required, the ASD is responsible for the coordination of an independent contractor to perform this service.

### 2.3 Advanced Science Incorporated

Advanced Science Incorporated is responsible for the collection, preparation of the samples for onsite transfer or offsite shipment to certified laboratories.

### 2.4 Analytical Laboratory

Conducts chemical and radiochemical analyses of samples provided by the ASD. Analyses are conducted in accordance with approved procedures and comply with quality assurance/quality control directives. The laboratory may be an onsite or offsite commercial facility.

### 2.5 Waste Certification

An independent organization that provides final certification that radiologically contaminated waste destined for offsite disposal conforms to all RFETS requirements and applicable waste acceptance criteria for the treatment or disposal facility.

### 2.6 Statistical Applications Engineering

An independently organization that reviews plans for sampling and the data generated from analysis of the samples and provides statistical analysis of the result.

### 2.7 Building 444 Facility Management

Building 444 facility management is responsible for locating the HEPA filter crates from their facility and preparing them for transfer to the 750 Pad Tent 5 for sampling.



### 3.0 DATA QUALITY OBJECTIVE

Data quality objectives (DQOs) have been developed to ensure characterization data are of known and acceptable quality and to satisfy the requirements of the treatment/disposal facility, DOT and the RFETS waste characterization program. The data must allow for the following questions to be answered:

- Are RCRA hazardous constituents present, at what concentrations, and what are the applicable EPA hazardous waste codes?
- What radioisotopes are present and at what levels? Does the waste form, IDC 490, from Buildings where depleted uranium activities were performed meet the Nevada Test Site waste acceptance criteria?
- Is the generated data by this SAP verifiable in accordance with Procedure L-5033, Data Completion Assessment and Quality Control Verification.

Analytical method requirements, discussed in Section 6, have been selected based on the DQO. The associated method detection limits and quality control requirements for the chosen methods will ensure data of known and acceptable quality are collected.

#### 3.1 90 Percent Confidence Limit

The data generated as the result of this SAP will be used to generate 90% upper confidence limits for mean chemical constituent concentrations and isotopic activities.

#### 3.2 Representativeness

The cube-root methodology will be used to determine the number of samples to be collected from the population under consideration. The total waste population is comprised of 203 filters from Building 444, 120 filters from Building 883 and 36 filters from Building 881, consequently, the data derived from this SAP will be applicable to the entire population. The cube-root for each subpopulation of filters (rounded to the nearest whole number) results in 6 samples for Building 444, 5 samples for Building 883, and 3 samples for Building 881. The usefulness of the cube root approach is provided in an internal memo from D. R. Weier to C. E. Baldwin, April 25, 1995, DRW-027-95.

#### 3.3 Sampling Accuracy

Optimum sampling accuracy will be achieved by using a simple random sampling approach for selecting the filters to be sampled.

#### 3.4 Sampling Precision

Discreet samples, as described in Section 4.0, of the filter media will be taken and composited to represent the entire filter. The sampling locations will be determined through random selection by the process specialists based upon their experience and expertise. A duplicate sample from one of the filters of each subset will be taken and analyzed, to evaluate the precision.

#### 3.5 Method Detection Limit

The ASD Statement of Work for Analytical Measurements sets the required detection limits for an analysis.

### 3.6 Completeness

Through proper control of schedules and personnel, all samples anticipated by this SAP will be taken. Through application of the Analytical Laboratory's Quality Assurance/Quality Control Program, all data generated from the analysis will be verified and useable for its intended purpose. No changes can be made to this SAP without approval of the organizations originally approving the SAP.

### 3.7 Comparability

All samples will be collected, analyzed, and the data evaluated using the same techniques.

## 4.0 SITE SELECTION AND SAMPLING PROCEDURES

Samples of HEPA filters will be collected at RFETS by qualified personnel in accordance with the requirements of this SAP, waste sampling procedure, L-6294-A, Waste Characterization Sampling Procedure inside Radiological Buffer Areas (RBAs), June 29, 1995. The sampling location will be on the 750 Pad Tent 5 PermaCon Facility. In general, the process specialists will remove a 12"X12" core from the center of the filter unit. The separators will be removed and discarded and the remaining filter media divided into representative samples as required for the individual tests. Then, the material is placed in identified sampling containers.

### 4.1 Sample Handling

The samples will be packaged, preserved at 4°C, and shipped to the designated laboratory for analysis. Unused sample will be properly disposed of by the laboratory.

### 4.2 Number of Samples

The number of HEPA filters to be sampled is determined by the cubed root of the number of HEPA filters in storage.

The following filters will be sampled:

<u>Building 444</u>	<u>Building 883</u>	<u>Building 881</u>
P01811-6	P00604-5	P01760-8
P01801-8	P00607-8	P01761-7
P01805-7	P00610-9	P01762-11 duplicate
P01808-10	P00603-11	
P01808-11	P00612-7 duplicate	
P01814-10 duplicate		

The samples will be subjected to other analysis described in Table 1-2. The number of containers from which the HEPA filter was taken will be recorded in the field sampling logbook along with filter number.

### 4.3 Sampling Equipment

The sampling equipment is described in the HEPA Filter Sampling from the Property Protected Area, RMRS/OPS-INSTR.025.

#### 4.4 Field Quality Control

Field quality assurance and quality control samples are also analyzed by the laboratory. These samples provide an internal quality control check and onsite of equipment planks, trip blanks and field blanks. Collection will be in accordance with L-6294-A, Waste Characterization Sampling Procedure Inside Radiological Buffer Areas. This procedure is presently revised.

#### 4.5 Decontamination Procedures

To prevent cross contamination of samples, all sampling equipment will be decontaminated. Sampling equipment decontamination will be in accordance with L-6294-A, Waste Characterization Sampling Procedure Inside Radiological Buffer Areas.

#### 4.6 Packaging and Sample Transfer/Shipping Requirements

The sample team will follow the sample packaging procedure approval by the ASD and Traffic Management. Onsite transfers and offsite shipments of samples to laboratories will comply with the requirements of the Rocky Flats Transportation Manual.

### 5.0 DOCUMENTATION AND SAMPLE CUSTODY

Data cannot be considered legally defensible without documented chain of custody procedure. Labels and seals are required to identify samples and to verify the sample has not been opened prior to analysis. Logbooks and sampling worksheets are used to document sampling events so the event may be reconstructed at a later date, should the need arise. Logbooks contain other pertinent information such as physical appearance of the sample. Specific label, seal, and logbook protocols are specified in Waste Characterization Sampling Procedure Inside Radiological Buffer Areas, L-6294-A and Chain-of-Custody, Waste Characterization Projects, L-3004-B. These procedures are presently revised but the requirements are still in effect. However, the Waste Characterization Sampling Procedure Inside Radiological Buffer Areas, L-6294-A is still applicable for sampling activities, additional, in this procedure chain-of-custody requirements are defined.

Chain-of-custody records are documents demonstrating sample integrity and appreciate sample management and are maintained from collection through disposal. Chain-of-custody forms are initially completed and signed during the sample collection and travel with the samples to receiving personnel at the laboratory. Sample request forms are generated for each sample collected. The Sample Request Form includes information describing:

- Process contacts
- Required sample volume
- Required quality assurance samples
- Availability of sample material
- Location of sample material
- Random sample location
- Radioactive concerns
- Directions and comments to the sampling team
- Instructions to the laboratory

The unique sample identification numbers assigned to each sample container are also printed on the Sample Request Forms. Sample Request Forms are obtained from the ASD.

## **6.0 ANALYSIS OF WASTE SAMPLES**

The ASD will receive the sampling and analysis requests, arrange for a qualified sampling team to perform the sampling evolution and designates the laboratories, either onsite or offsite, which will perform the requested analyses.

### **6.1 Waste Analysis Parameters**

Methods used to analyze the samples will be those identified in Table 1-2 or will be defined by the ASD approved documents.

### **6.2 Data Analysis**

The DQO will be demonstrated using the 90-percent upper confidence limit (UCL) for the mean for each of the analytes. Only acceptable, verified data will be used for the characterization. The 90-percent UCL, derived from the 80-percent 2-tailed confidence interval, will be determined using the Student *t* distribution. If the data does not agree with the WSRIC characterization in Table 1-1, an additional independent verification will be performed.

## **7.0 ANALYTICAL QUALITY CONTROL**

All quality control requirements are defined in the Analytical Services Division Statement of Work for Analytical Measurements which are followed by all onsite and offsite laboratories. Quality control requirements for RFETS laboratories supporting waste analysis are summarized in the Analytical Services On-Site Laboratories Quality Assurance Plan, 3-21000-ASD-SOW, Revision B, September 29, 1995. These analytical control criteria shall be used to verify that analytical results for organic and inorganic analyses are of a documented precision and accuracy. The laboratories shall analyze calibration standards, interference check samples, blanks, duplicates, and matrix spikes to demonstrate the control criteria have been met.

Data Assessment guidelines have been written to comply with the requirements of the Statement of Work and to meet the regulatory and DOE quality control requirements.

## **8.0 REFERENCES**

Rocky Flats Transportation Safety Manual.

Waste Characterization Sampling Procedure Inside Radiological Buffer Areas, L-6294-A.(Under Revision)

Analytical Services On-Site Laboratories Quality Assurance Plan, 3-21000-ASD-SOW, Revision B.

Data Completion Assessment and Quality Control Verification, L-5033

Chain of Custody Waste Characterization Project, L-3004-B (Under Revision)

Waste Stream and Residue Identification and Characterization , Buildings 450 and 881F.

HEPA Filter Sampling from the Property Protected Area, RMRS/OPS-INSTR.025

Analytical Services Division Statement of Work for Analytical Measurements